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New or interesting algae from the lakes of Wisconsin

GILBERT MORGAN SMITH

(WITH PLATES 24–26)

The present paper embodies various notes that have accumulated in a study of the algae of Wisconsin lakes for the Wisconsin Natural History and Geological Survey. Although a systematic account of the algae found has been prepared, it has been thought advisable to publish descriptions of the new species and notes on certain other species at this time.

Chaetosphaeridium ovalis sp. nov.

Thallus of five to twenty cells, epiphytic upon filamentous Chlorophyceae, gelatinous sheath indistinct. Cells ovoid, with two parietal chloroplasts each containing a pyrenoid. Sheath at the base of setae conspicuous.

Cells 22–20 μ long, 15–13 μ wide; length of setae about 125 μ; basal sheath of setae 15×3 μ.

PLATE 24, FIG. 1

DISTRIBUTION: along shore, Marion Lake.

The two species of the genus that are generally recognized, *C. globosum* (Nords.) Klebh. and *C. Pringsheimii* Klebh., are found also in the lakes of the state. *C. ovalis* resembles *C. Pringsheimii* forma *conferta* Klebh. in the arrangement of its cells, but the cell-shape is quite different. This species also differs from the others since it is the only one which regularly has more than a single chromatophore, while the basal sheath of the bristle is also more conspicuous in this than in the other species.

Oocystis panduriformis minor var. nov.

Cells 35–30 μ long; maximal diameter 15–12 μ, median diameter 14–11 μ.

PLATE 24, FIG. 2

DISTRIBUTION: plankton, Star Lake.

The type form, described by W. and G. S. West,* is nearly twice as large as the dimensions given above. The peculiar median constriction and the numerous chromatophores, however, show that the above described alga should be considered a variety of *O. panduriformis* W. West.

TETRASTRUM APICULATUM (Lemm.) Brunnthaler

Staurogenia apiculata Lemm. Bot. Centralbl. **76**: 151. 1898; Forschungsb. Biol. Stat. Plön **7**: 119. *pl. 1, f. 14.* 1899; Schmidle, Ber. Deutsch. Bot. Ges. **18**: 157. 1900.

Tetrastrum apiculatum Brunnthaler; Pascher, Süsswasser-flora Deutschlands, Österreichs und der Schweiz. **5**: 177. *f. 258.* 1915.

PLATE 24, FIG. 3

I have observed this alga twice in the plankton of Lake Mendota. Some investigators follow Schmidle in placing *Tetrastrum* as a subgenus of *Crucigenia* Morren, but in my opinion the two genera are distinct.

CHARACIUM STIPITATUM (Bachmann) Wille

Chlamydomonas stipitata Bachmann, Arch. Hydrobiol. u. Planktonkde. **3**: 81. *f.* XI^{1}–XI^{15}. 1908.

Characium stipitatum Wille; Engler & Prantl, Nat. Pflanzenfam. 1^{2} (Nachtr.): 45. 1911; Brunnthaler in Pascher, Süsswasserflora Deutschlands, Österreichs und der Schweiz **5**: 81. *f. 26.* 1915.

PLATE 24, FIGS. 4–6

This peculiar species was previously known only from Scotland, where it was described as a *Chlamydomonas* species. I have found it in the plankton of three lakes, Minocqua, Pardee and Sisheboga, in the northern part of the state. There is but little doubt that this is the same organism as that described by Bachmann, since the cell-shape and dimensions agree and it is only found epiphytic upon the same alga, *Coelosphaerium Naegeliana* Unger (*Gomphosphaeria Naegeliana* Lemm.).

The alga is entirely enclosed by the gelatinous envelope of the *Coelosphaerium* colony and does not, as Bachmann describes, merely have its stipe in the envelope. The figure copied by Brunn-

* Jour. Roy. Micr. Soc. **1894**: 15. *pl. 2, f. 33–35.* 1894.

thaler is not typical since the pyrenoid is never outside of, but always within, the chromatophore.

Kirchneriella elongata sp. nov.

Colonies of four, eight, sixteen, or many cells embedded in a copious homogeneous matrix. Cells cylindrical, rounded at ends, spirally or irregularly twisted into a knot-like snarl. Chloroplast single, parietal, without (?) a pyrenoid.

Colonies up to 100 μ in diameter. Cells 25–15 μ long, 2.75–2.00 μ wide.

PLATE 24, FIG. 7

DISTRIBUTION: plankton, No Mans Lake; along shore, Plum Lake.

This species approaches *K. contorta* (Schmidle) Bohlin, which I have collected from four Wisconsin lakes, but the cells are larger, some being twice as long as those of *K. contorta*, and there are usually more cells to the colony.

SCHROEDERIA SETIGERA (Schröder) Lemm.

Reinschiella setigera Schröder, Ber. Deutsch. Bot. Ges. **15**: 489. *pl. 25, f. 4.* 1897.

Schroederia setigera Lemm. Hedwigia **37**: 311. 1898.

Raphidium setigerum W. & G. S. West, Trans. Yorkshire Nat. Union **25**: 122. 1901.

Ankistrodesmus setigerus G. S. West, Brit. Freshw. Algae 224. *f. 94F.* 1904.

PLATE 24, FIG. 8

An organism found in the plankton of Devil's Lake agrees very well with the original description of *S. setigera*, with one exception. Schröder and the Wests appear to be the only ones who have observed the living plant and neither mentioned the disc at the end of one of the prolonged apices. There is no doubt in my mind but that this structure was present in the cells they studied, but since it is practically invisible under a magnification of six hundred diameters or less, they probably overlooked it.

An apparently closely related form is *Ankistrodesmus nitzschioides* G. S. West,* which has also been figured by Printz.† It differs

* Jour. Linn. Soc. Bot. **38**: 140. *pl. 5, f. 18.* 1907.

† Skr. Vidensk. Kristiania, Math.-Naturvid. Kl. **1913**[6]: 97. *pl. 7, f. 217–220.* 1914.

only in the lack of a pyrenoid and the terminal disc. G. S. West and Brunnthaler place the species in the genus *Ankistrodesmus*. Although the shape of the cells shows a great resemblance to that of *Ankistrodesmus* I believe that the retention of the genus *Schroederia* is to be preferred. If this species with the fine hair-like terminal processes can be shown to reproduce in the same manner as *Ankistrodesmus*, *Schroederia* should be considered a synonym; but since, in my observations on over a thousand individuals, I have never found autospores within the mother cell wall (a condition occurring abdundantly in all species of *Ankistrodesmus*), I am convinced that this species does not reproduce in the same manner as *Ankistrodesmus*. On the other hand the disc-shaped end of one of the apical processes suggests that the species may be an epiphytic *Characium*, possibly like *C. limneticus* Lemm. At first I considered it an epiphytic form that had broken off but since the examination of so many individuals has not shown any attachment to other plankton, it must be assumed to be naturally free-floating and not accidentally detached.

Schroederia Judayi sp. nov.

Cells fusiform, straight or curved, ends attenuated into hair-like projections, one of which terminates in a disc. Chromatophore single, parietal, with one pyrenoid.

Length, with spines, 63–45 μ, without spines, 30–14 μ; breadth 6–2.5 μ; width of terminal disc 4–2 μ.

PLATE 24, FIGS. 9–11

DISTRIBUTION: plankton, Birch, Kawaguesaga, Kegonsa and Mendota Lakes.

This species resembles the Egyptian *Ankistrodesmus setigerus* forma *minor* G. S. West but is somewhat longer, twice as wide, and never lacks a pyrenoid. It is named after Mr. Chauncey Juday, who first called my attention to it.

Gloeocystopsis gen. nov.

Cells elongate, cylindrical, more or less curved, with rounded ends. Cells aggregated in fours or eights within a non-lamellated, sharply defined, spherical, gelatinous sheath. Colonies of an indefinite number of these aggregates arranged in a spherical or ovoid mass. Chromatophore diffuse, assimilation product starch.

Reproduction, aside from cell division, unknown. (Name from *Gloeocystis* and ὄψις, appearance.)

This genus combines the general external morphological characteristics of *Gloeocystis* Naegeli and the cell shape of *Nephrocytium* Naegeli. Although ovoid cells have been described in species of *Gloeocystis*, the cells of this species are too markedly lunate to be classed with *Gloeocystis*. The enveloping mucilaginous mass around the cell aggregates is not lamellated as in *Gloeocystis*, neither is there a common gelatinous envelope for these aggregates. On the other hand although the cell-shape resembles certain *Nephrocytium* species (*N. allantoideum* Bohl. for example) the ovoid colonies of *Nephrocytium* are not composed of distinct aggregates of cells, each with its own envelope.

A further study of the method of reproduction, whether by autospores or zoospores, will determine the exact systematic position of the genus. From the data at hand the natural inference is that it should be placed in the vicinity of *Gloeocystis*.

Gloeocystopsis limneticus sp. nov.

Cells 15–10 μ long, 6–4 μ wide. Cell aggregates 30–25 μ in diameter. Colonies up to 125 μ in diameter.

PLATE 24, FIG. 12

DISTRIBUTION: plankton, Catfish and Harris Lakes.

The alga was found in two lakes in northern Wisconsin which are about fifty miles apart and on different watersheds. The dimensions of the alga are the same in both stations. It is probable that *Gloeocystis Rehmanni* Woloszynska from Africa is another species, but since the original description is very vague and no cell-dimensions are given, it must remain a doubtful species until more fully described.

Pediastrum sculptatum sp. nov.

Colonies oval or circular discs of eight to thirty-two cells. Interior cells four- to six-sided with few interstices between the cells. Marginal cells bilobed, with the lobes produced into divergent or parallel horn-like processes. Cell wall covered with a network of very fine ridges.

Diameter of colonies 150–80 μ; diameter of cells 15–10 μ.

PLATE 25, FIG. 13

DISTRIBUTION: plankton, South Turtle Lake.

The shape of the cells in this species resembles *P. Boryanum* (Turp.) Menegh. but the markings are decidedly different. The nearest approach in cell-marking is found in *P. araneosum*, but reticulations in this species are much coarser.

Pediastrum araneosum (Raciborski) comb. nov.

Pediastrum angulosum var. *araneosum* Raciborski, Verh. u. Sitzungsb. Akad. Wiss. Krakau **20**: 101. 1889.

DISTRIBUTION: plankton, Devil's Lake; along shore, Beaver and Muskallonge Lakes.

This has been regarded as a variety and not a distinct species. In my opinion the coarsely reticulate structure of the wall, which is correlated with a certain cell-shape, is sufficiently distinctive to warrant regarding it as a distinct species and not as a variety of some other species.

Pediastrum araneosum rugulosum (G. S. West) comb. nov.

Pediastrum Boryanum var. *rugulosum* G. S. West, Jour. Linn. Soc. Bot. **38**: 132. *pl. 5, f. 22.* 1907.

PLATE 25, FIG. 14

DISTRIBUTION: plankton, Meta Lake.

With the recognition of *P. araneosum* as a species the variety *rugulosum* very naturally comes under this species instead of *P. Boryanum.*

Peroniella planctonica sp. nov.

Cells single, gregarious, epiphytic upon cells of, and embedded in, mucilaginous envelopes of *Sphaerozosma.* Cell-shape ovoid-pyriform, with a long delicate stipe. Chromatophore single (rarely two), yellow-green in color, without pyrenoid or starch. Reproduction by division of cell contents into two to four zoospores with one (?) cilium.

Length of cell, without stipe, 9.5–6 μ; with stipe, 18–15 μ; stipes 10–8$\times$1.2 μ.

PLATE 25, FIG. 15

DISTRIBUTION: on *Sphaerozosma* sp., in plankton of Devil's Lake.

The genera *Peroniella* Gobi and *Stipitococcus* W. & G. S. West are quite similar but differ in that the cells of the latter are apiculate or irregularly expanded at the apex and are not ovoid. Since the apices of the cells are rounded in the above described alga it belongs to the genus *Peroniella*. It differs from the single known species, *P. Hyalothecae* Gobi, in that the cells are ovoid and smaller.

A study of the cell contents shows that the genus should be classified with the Heterokonteae and not with the Chlorophyceae. The chromatophores are without starch or pyrenoids and have a decided yellowish green color. Numerous oil droplets, which are probably the product of assimilation, are scattered throughout the cytoplasm. Few instances of zoospore formation were found, but those that were showed no lateral rupture through which the zoospores escaped, as Gobi* describes for *P. Hyalothecae*. Only one cilium was observed although a very careful search was made for a second shorter one. In this respect it resembles certain other Heterokonteae.

Chodatella ciliata minor var. nov.

Cells ovoid, with eight to six bristles at each end.
Cells 10–8 μ long, 7.5–6 μ wide; bristles about 20 μ in length.

PLATE 25, FIG. 16

DISTRIBUTION: plankton, Muskallonge Lake.

The cells of this species are about the same size as those of *C. subsalsa* Lemm., but the number of terminal bristles is that of *C. ciliata* (Lagerh.) Lemm. The variety *minor* never reaches the minimal limit of the type form.

MICRACTINIUM PUSILLUM Fresenius

Micractinium pusillum Fresenius, Abh. Senckenberg. Naturf. Ges. **2**: 236. *pl. 11, f. 46–49.* 1858; Lemm. Ber. Deutsch. Bot. Ges. **22**: 21. 1904; Wille in Engler & Prantl, Nat. Pflanzenfam. 1^2 (Nachtr.): 57. 1911.

Archerina Boltoni Lankester, Quart. Jour. Micr. Sci. N. S. **25**: 61. *pl. 7, f. 1–23.* 1885; *l.c.* **52**: 423. 1908.

Golenkinia botryoides Schmidle, Allg. Bot. Zeitschr. **2**: 194. 1896.

Golenkinia fenestrata Schröder, Ber. Deutsch. Bot. Ges. **15**: 492. *pl. 25, f. 5.* 1897.

*Scripta Bot. Hort. Univ. Petrop. **2**: 233–255. *pl. 1.* 1886–1887.

Richteriella globosa Lemm. Forschungsb. Biol. Stat. Plön **5**: 107. 1897.

Richteriella botryoides Lemm. Hedwigia **37**: 307. *pl. 10, f. 1–6.* 1898; Arch. Hydrobiol. u. Planktonkde. **5**: 306. 1910.

Richteriella botryoides forma *fenestrata* Chodat, Matér. pour la Flore Crypt. Suisse 1^3: 194. *f. 110.* 1902.

Richteriella botryoides forma *tetraedrica* Lemm. Arch. Hydrobiol. u. Planktonkde. **5**: 307. 1910; Ber. Deutsch. Bot. Ges. **18**: 90. *pl. 3, f. 9–10.* 1900.

PLATE 25, FIG. 18

This alga is most widely known as *Richteriella botryoides*, a name which is untenable under any circumstance. In 1904 Lemmermann pointed out that the overlooked genus *Micractinium* Fresenius bears considerable resemblance to *Richteriella* Lemm. He thinks, however, since the description is so vague and most of Fresenius's figures illustrate only single cells, that the organism Fresenius saw was what is commonly called *Golenkinia*. Wille holds that all of the spherical-celled forms with radiating bristles constitute a single genus and makes the subgenus *Golenkinia* for the solitary forms and *Richteriella* for the colonial ones. He very logically applies Fresenius's name *Micractinium* to this composite genus.

In my opinion the colonial and solitary habits are too diverse to warrant placing both of them in the same genus. The question then arising is, shall *Micractinium* be substituted for *Golenkinia* or for *Richteriella?* Lemmermann's account (1904) creates the impression that Fresenius's description fits *Golenkinia* better than *Richteriella*. The cell measurements given by Fresenius, 1/170–1/150 mm. (5.88–6.67 μ) as a maximal and 1/300 mm. (3.33 μ) or less as the minimal dimensions, are much nearer *Richteriella botryoides* than *Golenkinia radiata* Chodat or any other *Golenkinia* species. It must be admitted that Fresenius does not emphasize the colonial habit, which characterizes *Richteriella*, but he does state that colonies of two to four cells are found and that there may be more than four cells in the colony so that a berry-shaped (mulberry?) colony is formed. Since *Golenkinia* forms only temporary colonies and since these never contain more than four cells it seems to me that the organism Fresenius saw is the one which Lemmermann has described as *R. botryoides*.

Lankester states that the genus *Archerina* antedates *Richteriella*. There is no question of the identity of the two organisms, *f. 21* of Lankester's plate being especially characteristic. In the material studied by Lankester he mistook a naked amoeboid parasite investing the plant cells for an integral part of the organism and so considered *Archerina* a protozoan and not an alga. The name *Richteriella* cannot be retained in any case, since those who regard the description of *Micractinium* as being too vague should use *Archerina* in its place.

This alga, which I have found in abundance in some of the local lakes, at times forms large irregular colonies containing over a thousand cells. The most common state, however, is the flat plate of sixteen cells with an open central space, the form *afenestrata* Chodat. This name and also the form-name *tetraedrica* Lemmermann are unwarranted since they may both occur in the same colony.

Micractinium quadrisetum (Lemm.) comb. nov.

Richteriella quadriseta Lemm. Hedwigia **37**: 307. *pl. 10, f. 7.* 1898.
Richteriella botryoides var. *quadriseta* Chodat, Matér. pour la Flore Crypt. Suisse 1[3]: 194. 1902.

PLATE 25, FIG. 17

DISTRIBUTION: plankton, Catfish and Cranberry Lakes.

The character on which the specific name is based, that of four spines, is not constant enough to warrant the establishment of a separate species. It is probably on this account that several investigators have followed Chodat's lead and considered it a form hardly worthy of naming. On the other hand the cell is always distinctly ovoid in this species, whereas it is always spherical in *M. pusillum*. The cell-dimensions in *M. quadriseta* are also always constantly larger. Since there are these differences *M. quadriseta* should be considered a distinct species.

Tetraedron planctonicum sp. nov.

Cells four- or five-sided, sides generally incurved and equal. Angles of cells prolonged into bifurcate or trifurcate processes ending in two or three horns. Processes broad in top view, narrow in side view.

Diameter of cell without processes 24–18 μ; with processes (diagonally) 70–50 μ; diameter of processes 12–9×8–5 μ; length 25–15 μ.

PLATE 26, FIGS. 19–20

DISTRIBUTION: plankton, Cranberry, Lost, No Mans and Pardee Lakes.

This striking form is confined to the plankton of lakes in the northern part of the state. It resembles *T. limneticum* Borge to a certain extent but agrees more nearly with the description of *T. gracile* (Reinsch) Hansg. The processes differ from those of *T. gracile*, however, since when they are seen in a side view they are narrow but in a top view they are broad. The processes end in two horns in *T. gracile* while in this species there are often three.

Tetraedron lobatum polyfurcatum var. nov.

Cells four-sided, flat or pyramidal. Angles prolonged, tapering but slightly. Prolongations branching three to five times, ultimate branches with three spines. Prolongations nearly as long as cell. Sides of cell incurved.

Diameter (without processes) 20–15 μ; (with processes) 40–30 μ; diagonal diameter 50–35 μ.

PLATE 26, FIGS. 21, 22

DISTRIBUTION: plankton, Muskallonge and Pardee Lakes.

This may be classed as a variety of *T. lobatum* on account of the cell-shape, but the extensive system of rebranching apical prolongations is not found in any described variety of *T. lobatum*. The branches resemble *T. enorme* (Ralfs) Hansg. but the sides of the alga under consideration are too deeply incised and the corners of the cells too long to regard it as a variety of *T. enorme*.

Actinastrum gracillimum sp. nov.

Colonies of four or eight cells radiating from a common center. Cells elongate, cylindrical or slightly tapering. Chromatophore single, parietal, without a pyrenoid.

Cells 18–14 μ long, 2–1.75 μ wide.

PLATE 26, FIG. 23

DISTRIBUTION: plankton, Kegonsa and Mendota Lakes.

This is much more delicate than any previously described species of *Actinastrum*.

Cylindrospermum stagnale angustum var. nov.

Cells 4.5–4 μ wide; 10–8 μ long. Heterocysts 6.5–5.5 μ wide; 11–7 μ long. Spores 9–7 μ wide; 25–18 μ long.

PLATE 26, FIG. 24

DISTRIBUTION: bottom of Oconomowoc Lake.

The much narrower and shorter spores distinguish this from the type.

Spirulina laxa sp. nov.

Plant mass dark blue-green. Cells 2.5–2 μ wide, in a very loose spiral. Width of spiral 6–4 μ, distance between turns 20–15 μ. Cell contents blue-green.

PLATE 26, FIG. 25

DISTRIBUTION: along shore, Soft Lake.

The loose spiral suggests *Arthrospira* rather than *Spirulina* but, since a careful examination fails to reveal the presence of transverse walls, I am convinced the plant in question is a *Spirulina*.

Chroococcus limneticus distans var. nov.

Colonies spherical or ovoid, of four to thirty-two cells, rarely more, embedded in a copious, hyaline, unlamellated, gelatinous envelope. Cells hemispherical to spherical, with grayish or light blue-green contents, "gas vacuoles" rarely present.

Diameter of cells 7–6.5 μ; diameter of colonies up to 60 μ.

PLATE 26, FIG. 26

DISTRIBUTION: plankton, Cranberry and Muskallonge Lakes.

This *Chroococcus* variety has the characteristic *C. limneticus* Lemm. structure of a few spherical cells embedded in a wide gelatinous sheath. The cell-dimensions are different from those of the other *C. limneticus* varieties so that it seems best to regard it as a new variety.

Anabaena limnetica sp. nov.

Trichomes free-swimming, solitary, straight or slightly curved. Vegetative cells generally spherical, 10–14 μ in diameter, with "gas vacuoles." Heterocysts spherical, 10–12 μ in diameter. Spores smooth-walled, solitary, ovoid, adjacent to, or a short distance from, the heterocysts, 20–17 μ in diameter, 25–20 μ long.

PLATE 26, FIG. 27

DISTRIBUTION: plankton, Birch, Soft and Tamarack Lakes.

The species resembles *A. macrospora* Klebh. in the general appearance of the trichome, but the cellular dimensions are quite different, since the cells of *A. macrospora* are much smaller and the spores proportionally larger.

Lyngbya Birgei sp. nov.

Filaments free-floating, straight, rarely curved. Sheath firm, hyaline, homogeneous. Trichomes not constricted at cross walls, ends rounded but not attenuated. Cells shorter than broad, with many "gas vacuoles" at times.

Filaments 24–20 μ wide; trichomes 22–18 μ wide.

PLATE 26, FIG. 28

DISTRIBUTION: plankton, Kegonsa, Mendota, Monona, Oconomowoc, Squirrel and Waubesa Lakes.

Almost all of the true plankton species of *Lyngbya* have filaments that are less than 5 μ in diameter. The only other plankton species of any size is *L. Hieronymusii* Lemm., but the Wisconsin *Lyngbya* is much larger. This species is found in abundance in the Madison lakes and at times has been the major constituent of the "blooms" that have appeared in these lakes. This is especially the case in Lake Kegonsa. The cell contents at such times are very characteristic of "bloom"—producing Myxophyceae, since there are large numbers of reddish "gas vacuoles" in each cell. The species is named after Mr. E. A. Birge, Director of the State Survey.

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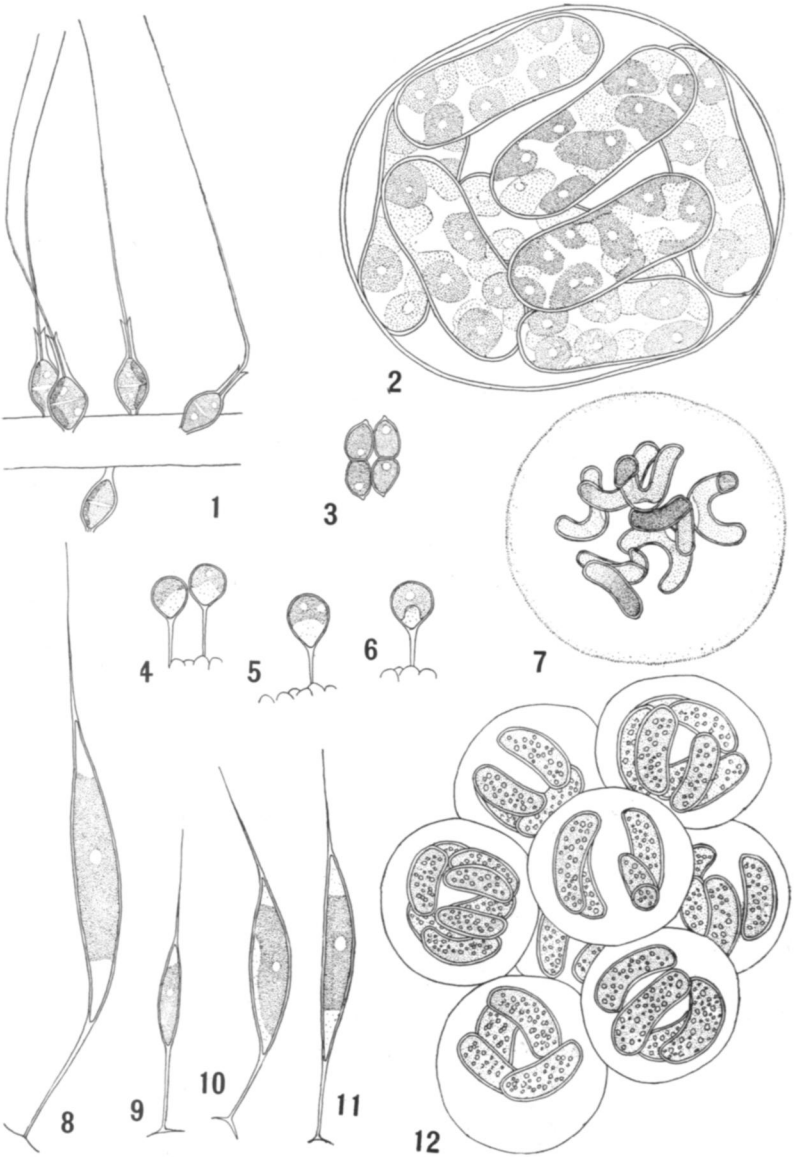
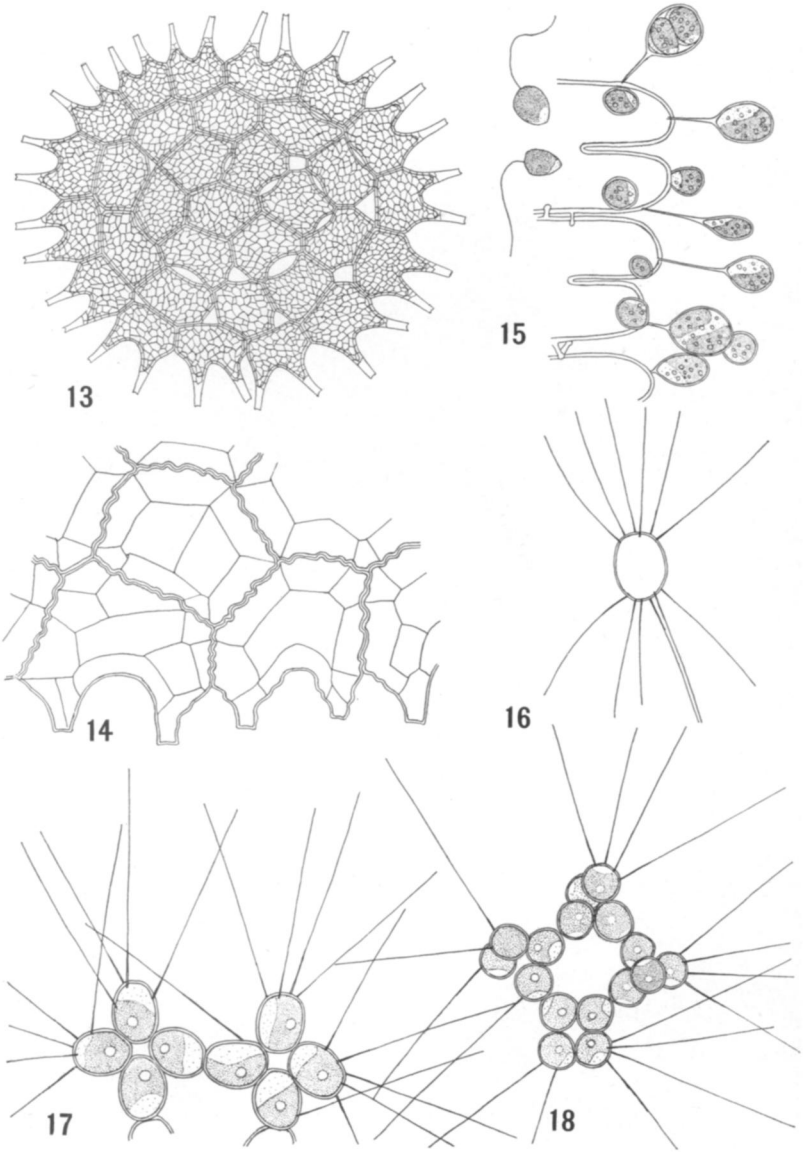
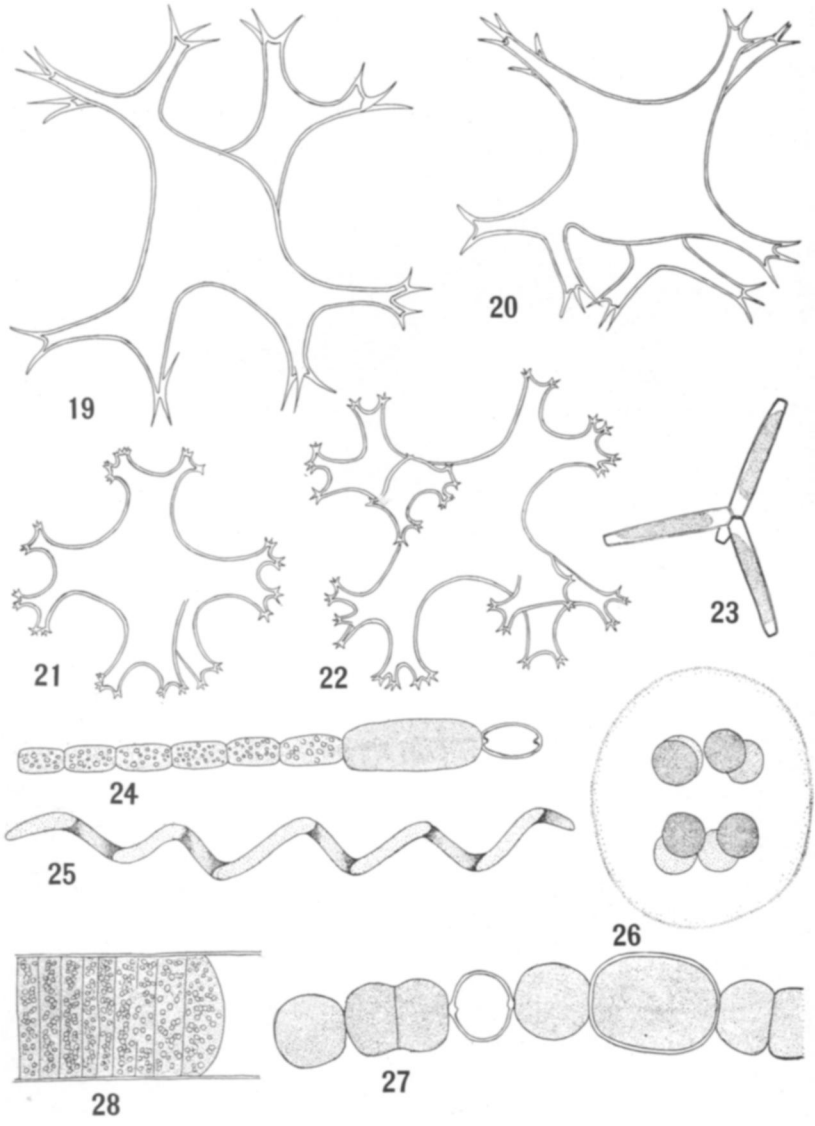


G. M. SMITH: WISCONSIN ALGAE



G. M. SMITH: WISCONSIN ALGAE



G. M. SMITH: WISCONSIN ALGAE

Explanation of plates 24–26

All the figures were drawn from life with the aid of the Abbé camera lucida, the drawings being made at the level of the base of the microscope. The Leitz objective 6 was used with the ocular 4, and the objective 1/16 with the oculars 1, 3 and 4. The magnifications are, respectively, 750, 1,000, 1,650 and 2,000 diameters. The drawings have been reduced a little more than one half (to eleven twenty-fourths their original size) in reproduction.

PLATE 24

FIG. 1. *Chae'osphaeridium ovalis* G. M. Smith, ×345.
FIG. 2. *Oocystis panduriformis minor* G. M. Smith, ×920.
FIG. 3. *Tetrastrum apiculatum* (Lemm.) Brunnthaler, ×920.
FIGS. 4–6. *Characium stipitatum* (Bachmann) Wille, ×920.
FIG. 7. *Kirchneriella elongata* G. M. Smith, ×920.
FIG. 8. *Schroederia setigera* (Schröder) Lemm., ×920.
FIGS. 9–11. *Schroederia Judayi* G. M. Smith, ×920.
Fig. 12. *Gloeocystopsis limneticus* G. M. Smith, ×920.

PLATE 25

FIG. 13. *Pediastrum sculptatum* G. M. Smith, ×460.
FIG. 14. *Pediastrum araneosum rugulosum* (G. S. West) G. M. Smith, ×920.
FIG. 15. *Peroniella planctonica* G. M. Smith, ×920.
FIG. 16. *Chodatella ciliata minor* G. M. Smith, ×920.
FIG. 17. *Micractinium quadrisetum* (Lemm.) G. M. Smith, ×920.
FIG. 18. *Micractinium pusillum* Fresenius, ×920.

PLATE 26

FIGS. 19, 20. *Tetraedron planctonicum* G. M. Smith, ×920.
FIGS. 21, 22. *Tetraedron lobatum polyfurcatum* G. M. Smith, ×920.
FIG. 23. *Actinastrum gracillimum* G. M. Smith, ×920.
FIG. 24. *Cylindrospermum stagnale angustum* G. M. Smith, ×920.
FIG. 25. *Spirulina laxa* G. M. Smith, ×920.
FIG. 26. *Chroococcus limneticus distans* G. M. Smith, ×760.
FIG. 27. *Anabaena limnetica* G. M. Smith, ×760.
FIG. 28. *Lyngbya Birgii* G. M. Smith, ×760.